



U.S. Department of Energy



Office of Science

Nuclear Physics Program Budget FY 2007

Nuclear Science Advisory Committee

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for Nuclear Physics
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Outline

- FY 2006 Appropriations
 - Impacts
- FY 2007 Nuclear Physics Budget Request
 - Context
 - Impacts
 - Implications
- Office of Nuclear Physics



FY 2006 Appropriations

Impacts

U.S. Department of Energy



Office of Science

Budget Request: \$370.4M (-8.4% : \$34M less than FY 2005)
Outyear Guidance: Flat or reduced funding

- Program was not sustainable at these funding levels
 - Required a significant restructuring and descoping
 - NSAC provided guidance for strongest U.S. program with projected funding

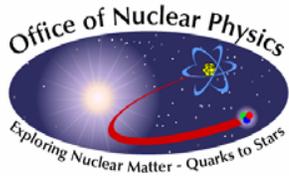
Appropriations (after rescission): \$367.0M (-9.0%: \$37M less than FY 2005)

- What has happened/is happening in FY 2006?
 - Research operating overall reduced by ~ 5%
 - University grants mitigated by carryover/budget period changes
 - Laboratory groups mitigated by redirection of funds
 - Believe that the projected ~12% reduction in PhD researchers/student will be less
 - Facility Operation overall reduced by ~ 14%
 - All facilities run less (RHIC unable to run without \$13M contribution)
 - All facilities have reductions in forces (but less than anticipated)
 - Continued investments for future
 - GRETINA, FNPB, STAR TOF and RHIC AIP EBIS
 - R&D for proposed CEBAF 12 GeV Upgrade, RHIC II and exotic beam capabilities

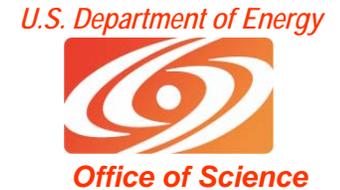


FY 2006 Nuclear Physics Appropriations

	(millions of dollars)			
	<u>FY04</u>	<u>FY05</u>	<u>FY06</u>	
University Research	56.2	58.0	55.4	(-4.5%)
Laboratory Research	63.7	66.4	63.7	(-4.1%)
SciDAC and LQCD	2.5	2.5	2.0	(-20%)
Research Cap. Equip.	<u>7.5</u>	<u>5.8</u>	<u>8.5</u>	
<Research>	129.9	132.7	129.6	(-2.3%)
RHIC	120.5	130.6	115.5	(-11.6%)
CEBAF	74.8	75.1	65.2	(-13.2%)
LE Facilities	23.6	24.9	22.7	(-8.8%)
MIT/Bates	<u>12.5</u>	<u>9.4</u>	<u>2.5</u>	
<Operations>	231.4	240.0	205.9	(-14.2%)
12 GeV Upgrade R&D	0.7	2.3	4.5	
RIA R&D	<u>5.9</u>	<u>6.4</u>	<u>4.0</u>	
<Facilities Initiatives>	6.6	8.7	8.5	(-2.3%)
RHIC EBIS (AIP)	<u>-</u>	<u>-</u>	<u>2.0</u>	
<Construction>	0.0	0.0	2.0	
<Stewardship>	<u>21.7</u>	<u>22.0</u>	<u>21.0</u>	(-4.5%)
Nuclear Physics Base	389.6	403.4	367.0	(-9.0 %)
<Katrina Supplement>	<u>-</u>	<u>1.4</u>	<u>-</u>	
Nuclear Physics Total	389.6	404.8	367.0	



FY 2007 Congressional Budget Request



- **SC Budget Request is +\$505M (+14.4%) above FY 2006 Appropriations**
- **NP Budget Request is + \$87M (+23.7%) above FY 2006 Appropriations**

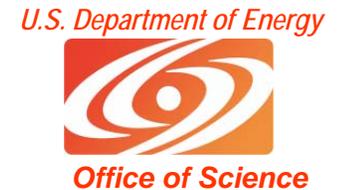
(dollars in thousands)

	FY 2005 Approp.	FY 2006 Approp.	FY 2007 President's Request	FY 2007 vs. FY 2006
Basic Energy Sciences.....	1,083,616	1,134,557	1,420,980	+286,423
Advanced Scientific Computing Research.....	226,180	234,684	318,654	+83,970
Biological and Environmental Research				
Base program.....	487,474	451,131	510,263	+59,132
Congressional-directed projects.....	79,123	128,700	—	-128,700
Total, Biological and Environmental Research.....	566,597	579,831	510,263	-69,568
High Energy Physics.....	722,906	716,694	775,099	+58,405
Nuclear Physics.....	394,549	367,034	454,060	+87,026
Fusion Energy Sciences.....	266,947	287,644	318,950	+31,306
Science Laboratories Infrastructure.....	37,498	41,684	50,888	+9,204
Science Program Direction.....	154,031	159,118	170,877	+11,759
Workforce Development for Teachers and Scientists.....	7,599	7,120	10,952	+3,832
Small Business Innovation Research/Technology Transfer.....	113,621	—	—	—
Safeguards and Security.....	67,168	68,025	70,987	+2,962
Subtotal, Science.....	3,640,712	3,596,391	4,101,710	+505,319
Use of prior year balances.....	-5,062	—	—	—
Total, Science.....	3,635,650	3,596,391	4,101,710	+505,319



DOE NP Program in FY 2007

Impact



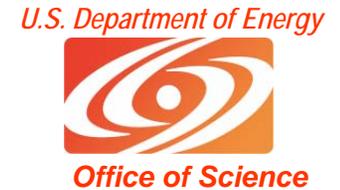
FY 2007 Budget Request for NP (\$454M) allows for effective utilization of the program's scientific facilities and makes important investments for the future

- University and Laboratory research efforts are restored to approximately FY 2005 levels.
 - Restoration of ~10% of PhD researchers and students
 - Support for SciDAC is increased
 - Enhanced efforts in nuclear data/measurements relevant to nuclear power
- National User Facilities (RHIC, CEBAF, ATLAS and HRIBF) operate at near optimum levels.
- Important instrumentation projects are continued and started:
 - Detector (STAR and PHENIX) and accelerator (EBIS) upgrades at RHIC
 - Heavy-ion detector upgrade at LHC/CERN
 - GRETINA
 - FNPB and EDM experiment at SNS
 - Lattice Gauge QCD (LQCD) Initiative (with HEP)
- The 12 GeV CEBAF Upgrade Project has obtained CD-1 approval.
 - Project Engineering and Design (PED) is supported in FY 2007
- R&D that address next generation capabilities is supported:
 - Superconducting radio-frequency developments at TJNAF
 - Electron cooling at RHIC to reach higher beam luminosities
 - No RIA R&D, but R&D at FY 2006 level to develop exotic beam capabilities



FY 2007 Nuclear Physics Budget Request

(millions of dollars)



	<u>FY05</u>	<u>FY06</u>	<u>Request</u> <u>FY07</u>	<u>vs FY06</u>	<u>vs FY05</u>
Research Operating	134.3	125.1	146.5	+17.1%	+ 9.1%
Research Cap. Equip.	<u>6.2</u>	<u>8.5</u>	<u>14.5</u>	+70.6%	+134%
<Research>	140.5	133.6	161.0	+20.5%	+14.6%
RHIC	130.6	115.5	143.3	+24.1%	+ 9.7%
CEBAF	75.1	65.2	77.5	+19.9%	+ 3.3%
HRIBF	11.7	10.9	13.7	+23.7%	+15.6%
ATLAS	10.2	8.8	12.4	+40.3%	+22.4%
88-Inch Cyclotron	3.0	3.0	3.1	+ 4.5%	+ 4.5%
MIT/Bates	<u>9.4</u>	<u>2.5</u>	<u>2.0</u>		
<Facility Operations>	240.0	205.9	252.1	+22.7%	+ 5.0%
12 GeV Upgrade R&D/PED	2.3	4.5	9.5		
EBIS (RHIC)	<u>-</u>	<u>2.0</u>	<u>7.5</u>		
<Construction>	2.3	6.5	17.0	+165%	+313%
Other (GPP/SBIR/etc)	<u>22.0</u>	<u>21.0</u>	<u>24.0</u>		
<Stewardship>	22.0	21.0	24.0	+14.3%	+9.1%
Nuclear Physics Total	404.8	367.0	454.1	+23.7%	+12.2%



FY 2007 Budget Request

Research

U.S. Department of Energy



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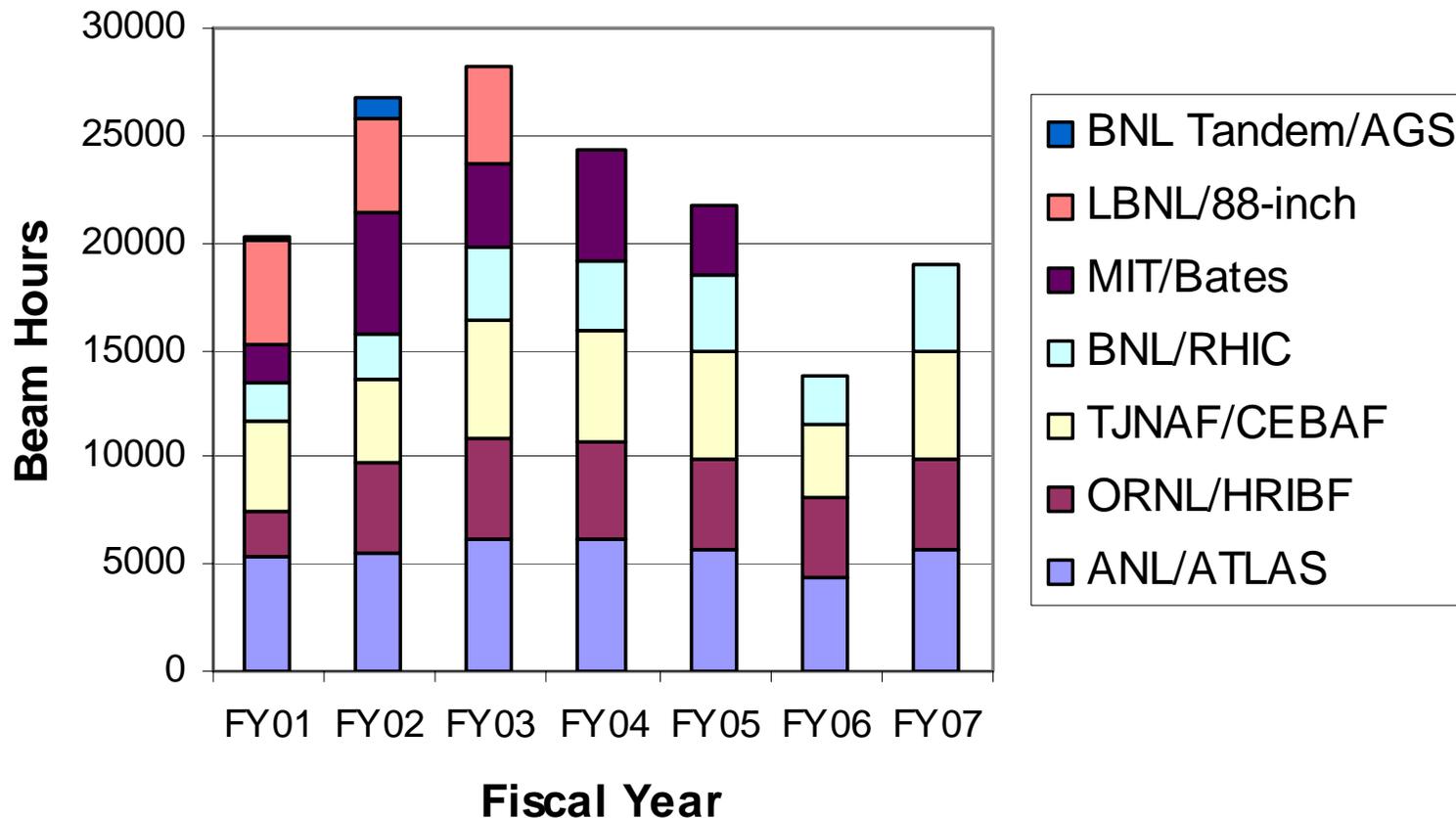
	<u>FY05</u>	<u>FY06</u>	<u>Request FY07</u>	<u>vs FY06</u>	<u>vs FY05</u>
<u>Research</u>					
Universities	58.0	55.4	63.1	+13.9%	+ 8.8%
Laboratories	67.5	63.7	74.0	+16.2%	+ 9.6%
SciDAC & LQCD	2.5	2.0	3.0		
Exotic Beam R&D	6.4	4.0	4.0		
Enhanced R&D for NE	-	-	2.4		
Operating Subtotal	134.3	125.1	146.5	+17.1%	+9.1%
<u>Research Capital Equipment</u>					
GRETINA	2.5	3.0	3.9		
FNPB	1.2	1.9	1.5		
STAR TOF	-	2.4	2.4		
PHENIX VTX	-	-	2.0		
HI LHC	-	-	1.0		
nEDM	-	-	1.3		
University CE	1.5	0.8	0.9		
Laboratory CE	1.1	0.4	1.5		
Capital Equip Subtotal	6.2	8.5	14.5	+70.6%	+134%
Research Subtotal	140.5	133.6	161.0	+20.0%	+14.6%



FY 2007 Budget Request

Facility Operations

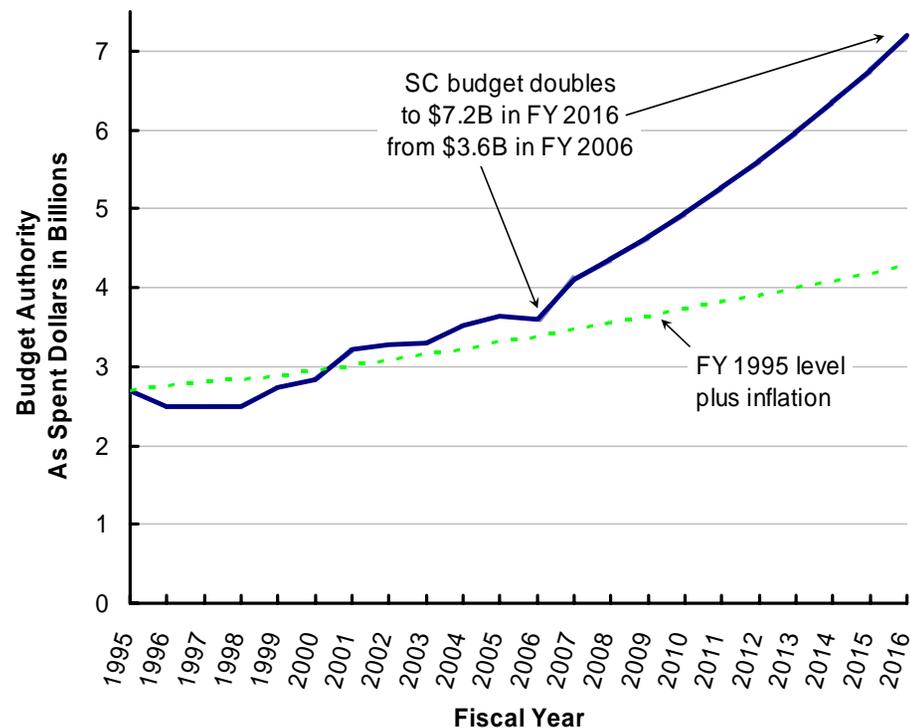
- **RHIC and CEBAF operate at ~92% of optimum utilization**
- **HRIBF and ATLAS operate at ~80% of optimum utilization**
(will take a ~ year to train new operators for 7-day operations)



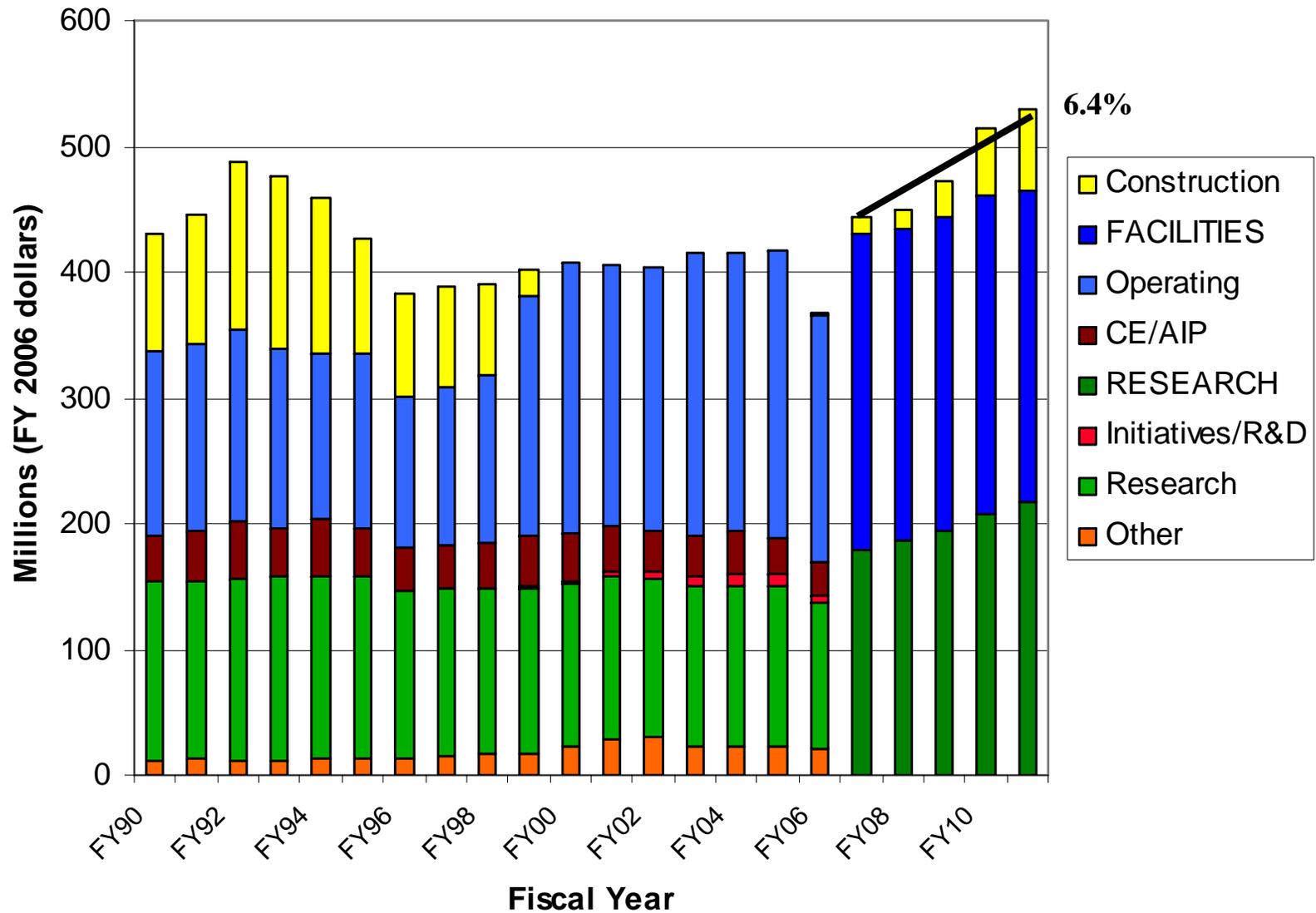
“We must continue to lead the world in human talent and creativity. Our greatest advantage in the world has always been our educated, hardworking, ambitious people - - and we're going to keep that edge. Tonight I announce an American Competitiveness Initiative, to encourage innovation throughout our economy, and to give our nation's children a firm grounding in math and science.”

“First, I propose to double the federal commitment to the most critical basic research programs in the physical sciences over the next 10 years. This funding will support the work of America's most creative minds as they explore promising areas such as nanotechnology, supercomputing, and alternative energy sources.”

**Office of Science Budget
Doubling from FY 2006 to FY 2016**



Nuclear Physics Funding History / Projection





FY 2007-2011 Nuclear Physics Program

Impacts / Implications

U.S. Department of Energy



Office of Science

Facility Operations

- Operate and implement the capabilities of the user facilities (RHIC, CEBAF, HRIBF and ALTAS) to achieve their scientific goals.
 - Proceed with the 12 GeV CEBAF Upgrade project.
 - RHIC accelerator/detector upgrades implemented and RHIC II construction starts midway in period
 - ATLAS and HRIBF research capabilities are developed to mount forefront programs.
 - R&D is supported to provide the basis for a decision to initiate preliminary engineering design at the end of this planning period for construction of a U.S. world-class exotic beam facility.

Research

- Research efforts and investments are supported to achieve the scientific goals and address highest priority new scientific opportunities
 - CEBAF 6-GeV program will be completed with several key experiments
 - RHIC program will characterize the newly discovered new states of matter with heavy ion beams and establish the contributions of gluons to the spin of the proton using a polarized beams
 - U.S. researchers at LHC will search for new states of matter at conditions different than RHIC
 - Studies of new nuclear structures and nuclear behaviors start with GRETINA
 - Measurements of fundamental neutron properties will begin at the FNPB at SNS
 - A neutrinoless Double Beta Decay experiment is fabricated
 - Investments in LQCD (with HEP) will provide the opportunity for unprecedented advances.
 - Accelerator R&D for next-generation nuclear physics research capabilities are supported.
 - Nuclear data measurements and code development will contribute to improved designs of next generation nuclear reactors
 - Support of graduate students will result in over 400 PhD degrees over this period



Charges to NSAC

The time is appropriate to begin a new long range planning exercise.

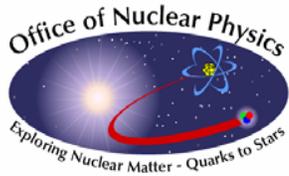
- The 2002 LRP is serving the nuclear physics community well, but five years since developed
- The President has set a budgetary framework for the physical sciences into the next decade.
- A charge will be presented in the summer 2006, and a report is needed by the end of October 2007.

A joint NSAC/HEPAP subcommittee (NuSAG) was formed to provide an assessment of opportunities identified by the recent APS study of neutrinos.

- NuSAG reports to the DOE/NSF thru NSAC and HEPAP, and is constituted for two years.
- NuSAG has prepared two reports:
 - On neutrinoless double beta decay (September 2005).
 - On reactor- and accelerator-based neutrino oscillation experiments (March 2006).
- DOE and NSF are requesting NuSAG to address an additional charge element, the APS Study's recommendation for a next-generation neutrino beam and detector configuration.
- The report to NSAC/HEPAP is requested by the end of this June.

The DOE will request that NSAC appoint a Committee of Visitors to examine the management and execution of the DOE nuclear physics program by the Office of Nuclear Physics.

- Charge will be presented in the summer 2006; the COV review will occur in about November 2006.



Nuclear Physics Office Activities

FY 2006 NP Outstanding Junior Investigators (OJI):

- Panel met February 13-14, 2006 -- 15 applicants -- awards announced later this month

DOE Early Career Scientist and Engineer Award

- John Arrington - Argonne National Laboratory
- Zhangbu Xu – BrookHaven National Laboratory

FY 2006 RIA R&D

- Review panel met December 2005 (context: 2003 workshop + progress in R&D efforts)
- 16 proposals funded: \$3.96 M available [\$18.4 M in requests]

Preparing for FY 2008 Budget Exercise (pre-CRB, CRB, OMB & President)

- Implementing the NP LRP within constrained funding levels
- Assessments of opportunities in Neutrino Science and the Heavy Ion review

Office of Nuclear Physics (NP)

- Selection process complete for two Division Directors
- New Program Manager for Advanced Technologies R&D – Manouchehr Farkhondeh
- Two new vacancies: Program Manager for Nuclear Physics Instrumentation and Program Manager for Low Energy Physics
- Three new detailees: David Lee, Wlodek Guryń, Fred Bertrand
- **Please contact our office if interested in detailee/IPA position**

Office of Nuclear Physics

